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Agricultural Experiment Station.

URBANA, MAY, 1902.

BULLETIN NO. 72.

ADDITIONAL INSECTICIDE EXPERIMENTS FOR THE SAN JOSE SCALE.

BY S. A. FORBES, STATE ENTOMOLOGIST.

The last observations reported in Bulletin 71 of the Illinois Agricultural Experiment Station were made March 25, at which time it now appears that the insecticide effect of the experimental applications made to trees infested by the San Jose scale was not yet complete, or at least not yet fully manifest. At the above mentioned date there were found on trees which had been treated with the Oregon and California washes twenty and twenty-two days previously, living scales in numbers varying from six to thirty-one per cent. of those alive in the beginning for trees treated with the California wash and from one to seventeen per cent. for those treated with the Oregon wash (see tables in Bulletin 71).

A careful examination of these experimental trees, made by Mr. E. S. G. Titus May 12, and a systematic count of dead and

living scales showed that by that time extremely few scales remained alive on any of these trees. Five hundred young scales of the preceding year were critically examined on each of eighteen trees—nine thousand scales in all—care being taken to choose lots from all parts of the tree up to the terminal twigs. Of these nine thousand scales, only thirty-five were living, the ratio of living to dead varying from none at all to a maximum of 1 per cent.—as near complete destruction as any field operation is likely to accomplish.

One half the trees on which these counts were made had been sprayed with the California wash and the other half with the Oregon wash; and sixteen of them were chosen in pairs such that the only difference between the treatment of the trees of each pair was the difference in the insecticide applied. Comparison shows that at the time these counts were made all the difference of effect between the two insecticides had disappeared, one proving finally as efficient as the other.

These eighteen trees were so selected as to represent ten variations of treatment with water, ranging from daily spraying for seven days in succession beginning with the next day after the insecticide treatment, to single applications of water after an interval so long as to have practically no effect. On a comparison of the reports concerning the different lots of these trees, I find no evidence that variations with the water treatment made any difference with the final effect of the insecticide. The destruction of the insects was retarded in some cases by frequent and early wettings, as shown in Bulletin 71, but was practically complete in every instance before May 12.

By those who have read Bulletin 71 (see page 243) it will be remembered that large percentages of the young scales of the preceding year were dead at the beginning of the experiment in consequence apparently of the character of the weather of the preceding summer. If allowance is made for this fact and the ratio of living to dead scales is reckoned with reference to those alive when the experiment began, we find that the ratio of scales still living on these eighteen trees on the 12th of May varies from none at all for five of the trees to 2.7 per cent. for one tree, the average ratio of living scales for the eighteen trees being a little less than .8 per cent.

In preparing Bulletin 71 I had no data in hand for a comparison of the insecticide effects of the lime and sulphur washes with whale-oil soap or petroleum, but Mr. Titus's visit of May 12 enables me to make good this deficiency. All the infested trees at

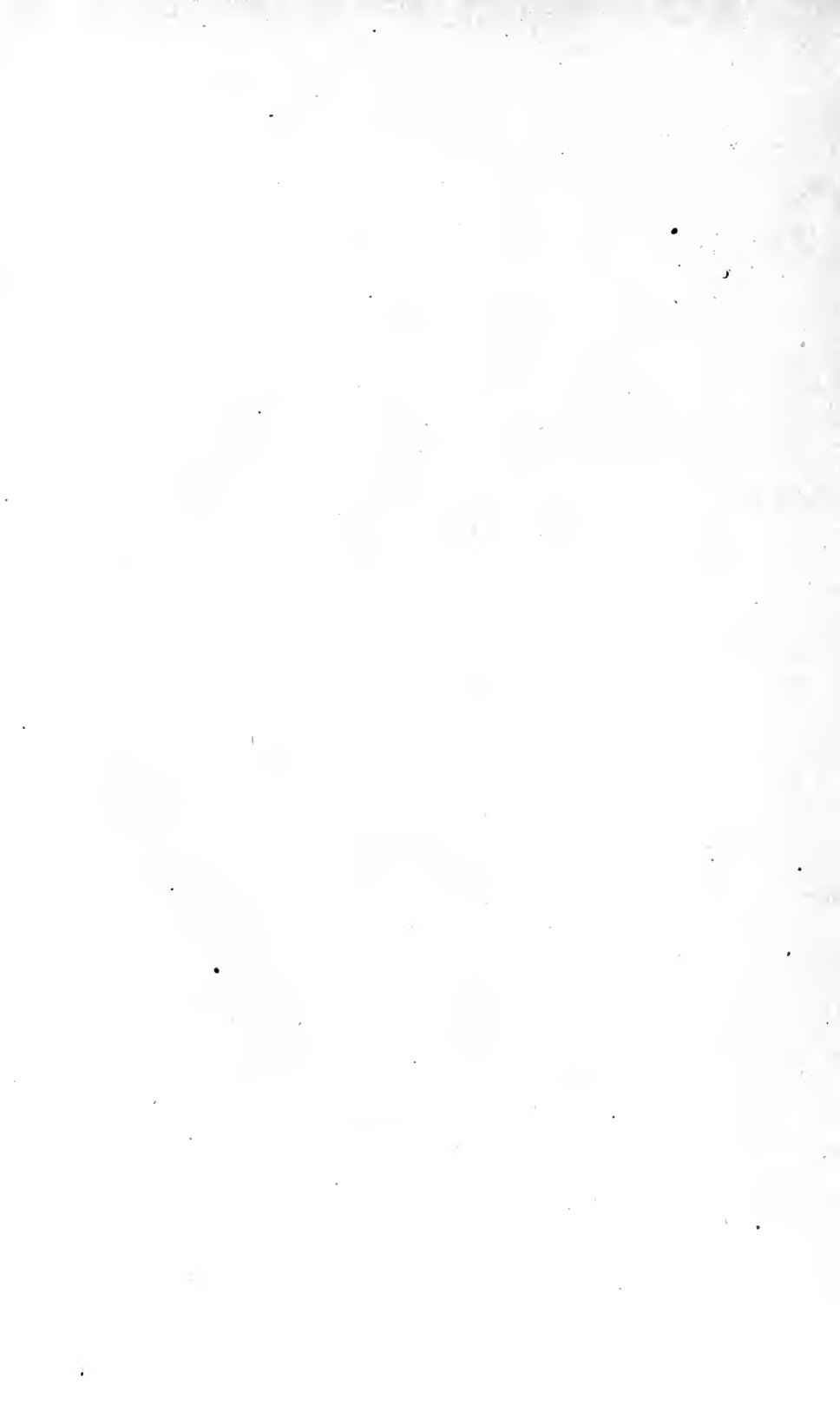
this place not used in the experiment had been sprayed with whale-oil soap in March by one of my regular field parties, and an examination of five thousand scales on eighteen of the trees so treated gave a total of 39 scales, a little more than twice the ratio of living to dead scales found on those which had been treated with the lime and sulphur washes.

From the foregoing it appears that certain of the statements made in Bulletin 71 must be modified with reference to these later and more complete results. It may be safely said that the washes applied were extremely efficient insecticides. Even such failures to kill the scales as occurred were probably due to imperfect distribution of the spray. The action of the washes is more prolonged than I have been previously led to infer, extending evidently beyond three weeks, and although at first considerable differences were noticeable between the Oregon and California washes, we must conclude from the above report that these are differences in promptness and rapidity of action rather than in the final effect. A similar statement may be made with reference to the effects of rain as represented by the application of water to our experimental trees. This clearly has the effect to delay, but not to prevent, a complete destruction of the scale, and it is apparent that these western washes, costing \$1.12 per hundred gallons, are at least as destructive to insect life as the solution of whale oil soap, costing \$6.50 for the same quantity.

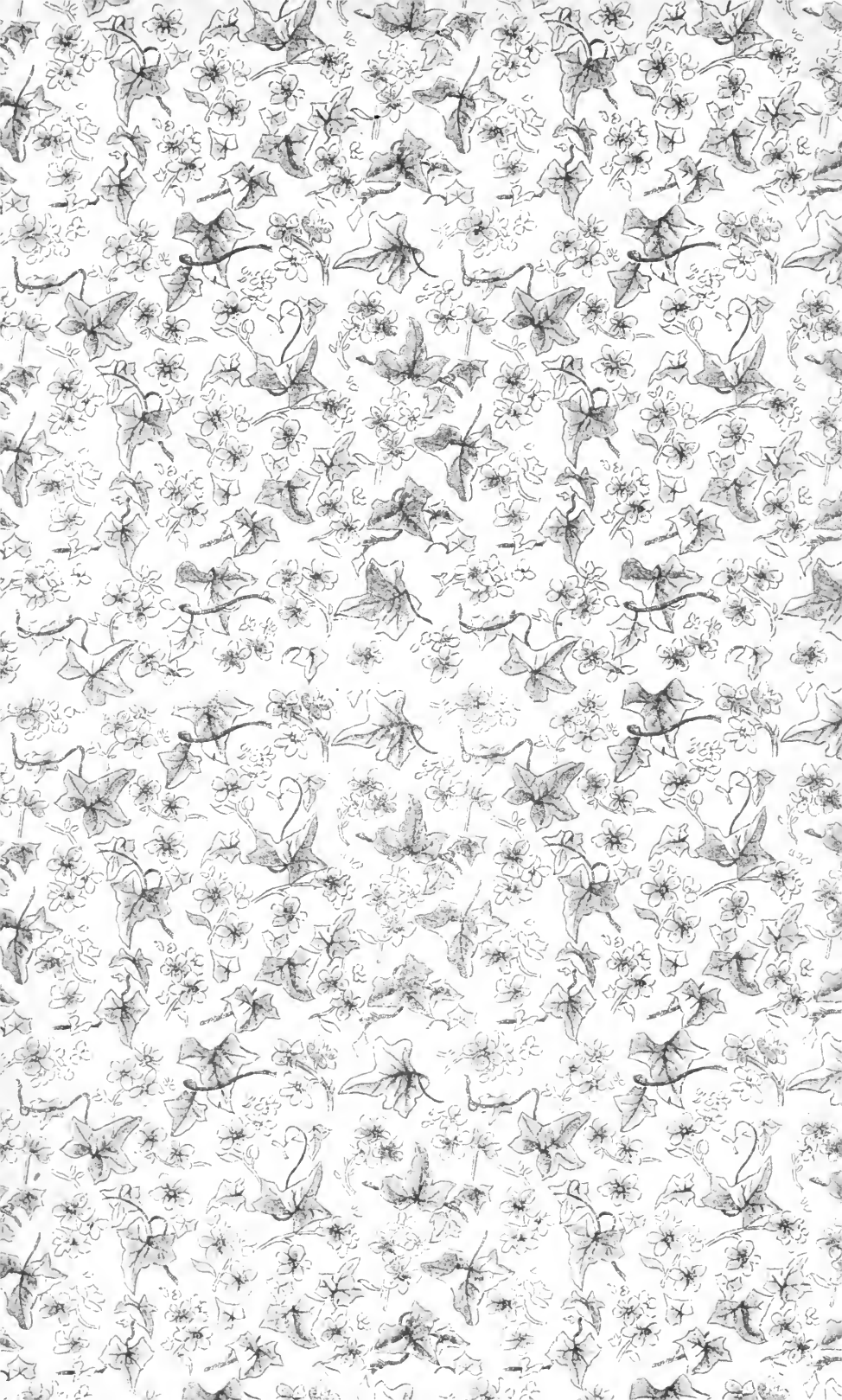
The following table will give some details of observation not reported in the text. The numbers used for the trees are the same as those in the tables of Bulletin 71, pages 249-258, and the experimental history of each tree can also be found in that bulletin. It is to be understood that five hundred scales were counted for each tree May 12. The first tree of each pair was sprayed with the California wash, and the second with the Oregon wash.

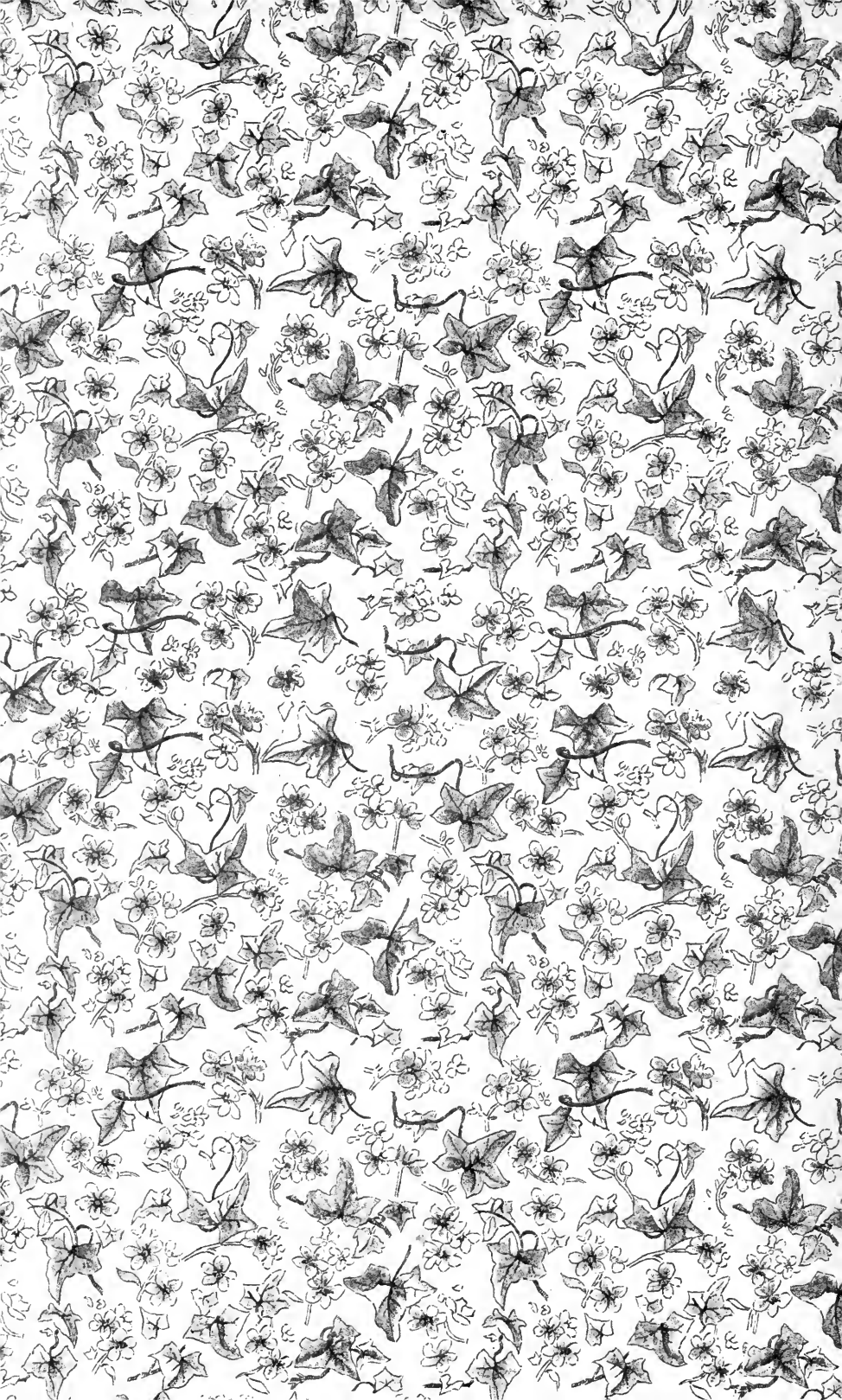
TABLE OF COMPARATIVE RESULTS.

| No. of Tree. | Date of Treatment. | Per cent. alive when treated. | Per cent. killed March 25. | Per cent. killed May 12. |
|--------------|--------------------|-------------------------------|----------------------------|--------------------------|
| 1 | March 3 | 40 | 79 | 100 |
| 11 | " 3 | 67 | 93 | 98.8 |
| 2 | " 3 | 37 | 90 | 98.9 |
| 12 | " 3 | 66 | 95 | 99.4 |
| 3 | " 3 | 29 | 78 | 98.6 |
| 13 | " 3 | 57 | 94 | 98.9 |
| 6 | " 3 | 64 | 86 | 100 |
| 14 | " 3 | 49 | 92 | 99.6 |
| 9 | " 3 | 56 | 89 | 99.6 |
| 16 | " 3 | 48 | 93 | 99.6 |
| 10 | " 3 | 60 | 95 | 99.4 |
| 28 | " 5 | 58 | 91 | 98.6 |
| 4 | " 5 | 42 | 78 | 100 |
| 18 | " 5 | 47 | 88 | 98.3 |
| 30 | " 5 | 44 | 89 | 100 |
| 31 | " 5 | 37 | 85 | 97.3 |
| 36 | " 5 | 51 | 97 | 100 |
| 24 | " 5 | 42 | 93 | 99 |
| Averages. | | 50 | 89 | 99.2 |









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